amount of theory as a basis, and a book which does not supply, in each branch, the necessary minimum hardly deserves to claim the title of a "comprehensive treatise." MAURICE SOLOMON.

PIONEER IRRIGATION.

Pioneer Irrigation for Farmers in the Colonies. By E. O. Mawson, M.Inst.C.E. With Chapters on Light Railways, by E. R. Calthrop, M.Inst.C.E. Pp. xvi+260. (London: Crosby Lockwood and Son, 1904.)

THE preface states that "this book has been written with the object of supplying pioneer farmers, in arid countries, with information which may assist them in conserving the precarious rainfall, and utilising it for the irrigation of crops"; also that "only the most homely contrivances, such as can be constructed and worked without professional advice or skilled labour are suggested"; and that the object "throughout the volume has been to demonstrate, in the simplest possible manner, how the available water-supply—whether surface-flow or underground—can be used for irrigating crops by means of works easily constructed at a small expenditure, without fear of danger in case of failure." The book, however, is not in reality confined within these prescribed limits; for it refers to earthen dams, with puddle trench, waste weir, and outlet valve tower, masonry dams of moderate height for forming reservoirs in gorges, a masonry aqueduct of several spans, and a barrage or weir across an apparently wide river, closed along the upper portion by a series of automatic sluice-gates. The works, indeed, shown in some of the woodcuts, and especially on plates 3 to 8, 10, and 19, could not possibly be regarded as homely contrivances, capable of being easily carried out by pioneer farmers, without skilled labour, at a small cost, and without danger to the neighbourhood in the event of failure.

The chapters on the value of irrigation and sources of water-supply, underground waters, methods of irrigation, and the cultivation of irrigated crops, vegetables, and fruit trees, contain much information which would be very useful to persons engaged in the cultivation of arid districts; but most of the works described in the chapters on dams and weirs, canals, sewage irrigation, and automatic sluice-gates, would be wholly beyond the resources of pioneer farmers. The storage of rainfall, the collection of the run-off of water in the rainy season by open tanks formed in depressions enclosed by low banks, and the drawing of underground waters from wells, are works which can be readily undertaken with great benefit by cultivators of arid lands; but the formation of large reservoirs by damming up valleys, and the raising of the water level of rivers and the conveyance of the water considerable distances in irrigation canals, constitute works which have to be carried out by a company, the local authorities, or the Government, for the irrigation of large tracts of land. Sewage irrigation, moreover, can only be made use of in the neighbourhood of large communities, and is not available amongst the sparse population of a newly-settled agricultural district.

In a chapter on automatic sluice-gates, a system of hinged gates or shutters is advocated for raising the water level of reservoirs and rivers, which has apparently been patented by one of the authors; but it is not stated that the design has been put into operation; and such automatic contrivances, as in the case of the movable shutter weirs employed long ago for the canalisation of some rivers in France, are liable to be very irregular in their action. The two concluding chapters furnish some interesting particulars about light railways, which are introduced with the view that the conveyance of the produce of irrigated lands to a market is second only in importance to the supply of water. Such works, however, with the great advantages that they afford, have to be carried out in the midst of a thriving community, where both capital and revenue are available; and they are beyond the scope of pioneer farmers who are extending cultivation into new, unoccupied districts. A long appendix is given at the end of the volume, containing various memoranda, tables, and particulars about materials and tools, which may be of service in irrigation works and farming. The book is, in fact, a short manual on irrigation works in general, with some account of the construction, suitable gauges, and rolling-stock of light railways.

OUR BOOK SHELF.

Lehrbuch der Stereochemie. By A. Werner. Pp. xvi+474. (Jena: Gustav Fischer, 1904.) Price 10 marks.

THIS book had its origin in the courses of lectures on stereochemistry delivered during recent years by Prof. Werner in the University of Zurich. The systematic form of the lectures has been adhered to, but by the addition of numerous tables and many hundreds of references to original sources, the author has produced a comprehensive handbook which must prove of great utility, not only to the general chemist who wishes to know something of the advances made in stereochemistry since the conception was first put forward, but also to the specialist whose work is directly concerned with the subject. Notwithstanding the wealth of detail, the book is of moderate compass, and whilst compression in the theoretical portions is occasionally carried to such an extent as to interfere somewhat with intelligibility, yet the book is on the whole both readable and easily comprehensible. The eminence of the author as an investigator in some of the most obscure fields of stereochemical research is sufficient guarantee of his mastery of both theory and material.

The work is composed of two chief parts, of which the first deals with stereoisomerism, divided into subsections according to the elements involved. The first subsection is naturally devoted to the stereoisomeric carbon compounds, and occupies about half of the whole book. In it are treated, amongst other matters, the theory of the asymmetric carbon atom, mirror-image isomerism, racemism and the resolution of racemic compounds, determination of configuration in open chains (more particularly in the sugars and related substances) and in closed chains, the quantitative relations between rotation and the nature of the asymmetric carbon atom, *cis-trans* isomerism in cyclic compounds, and the geometric isomerism of ethylenic compounds. The

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succeeding subsection deals with the stereoisomeric carbon-nitrogen compounds, such as the oximes, and is followed by a subsection on the substances that owe their stereoisomerism to the configuration of nitrogen atoms. The first part closes with an account of the optically active sulphur, selenium, and tin compounds, and of the geometric isomerism exhibited by the cobalt and platinum compounds with ammonia and the organic bases.

The second part of the work is concerned with stereochemistry unaccompanied by stereoisomerism, under which head are treated such matters as the stability of carbocyclic and heterocyclic chains, the stereochemical formulæ of benzene, and the influence of space-arrangement on the speed or possibility of chemical reactions, *e.g.* esterisation, formation of amides from esters, formation of triphenylmethane dyes, reduction of nitro-groups. Perhaps this part of the book will be found as useful as any, for it marshals under one point of view a great array of facts otherwise scattered and difficult of access.

Prof. Werner's book should be in the possession of every organic chemist.

The Fauna of British India, including Ceylon and Burma. Published under the authority of the Secretary of State for India in Council. Edited by W. T. Blanford. Rhynchota, vol. ii., part ii. Heteroptera. By W. L. Distant. Pp. i–iv, xi–xvii, 343–503; figs. 168–319. (London: Taylor and Francis, 1904.) Price 10*s.*

THE first part of vol. ii. of this work was published in December, 1903, and was noticed in NATURE for February 25, 1904, and we have not had long to wait for the second part, completing the volume, the preface of which bears date April, 1904. The total number of species described in the second part is 511, bringing up the total number of species described in the first two volumes of the work to 1471. The second part of vol. ii. completes the great family Reduviidæ (subfamilies Acanthaspidinæ to Nabidinæ), which is fam. 12 of Mr. Distant's arrangement. The volume also includes the families Saldidæ, Ceratocombidæ, Cimicidæ, and Capsidæ. This completes the land bugs, with the exception of the Anthocoridæ. These, with the two last families of the Gymnocerata (Hebridæ and Hydrometridæ), which are aquatic or subaquatic, are left over to be included with the Cryptocerata, all of which are aquatic, in the third volume, which will complete the work so far as the Heteroptera are concerned. The Homoptera will also be commenced in vol. iii.

Other volumes of this series in preparation are to include certain families of Coleoptera (especially those of economic importance), the butterflies, and the land mollusca.

Analytical Chemistry. Vol. ii., *Quantitative Analysis.* By F. P. Treadwell, Ph.D. Translated from the second German edition by William T. Hall, S.B. (New York: Wiley and Sons; London: Chapman and Hall, Ltd., 1904.) Price 17*s.* net.

IT is a little curious that this volume, which appeared in German in 1901, should have reached a second edition before finding an American translator, as one might suppose that its many excellences would have hastened the fate which has overtaken a number of less valuable German treatises.

The author states in the preface that the majority of the methods which he describes have been submitted to careful examination in his own laboratory, a fact clearly evident from the minutiæ which are introduced at every step. This is precisely what gives a work on analytical chemistry a real value. There is an introductory chapter on general manipulation, details, and apparatus, including the use of the Gooch crucible, that ingenious and time-saving combination of filter and crucible which is much too little known and used.

The subsequent chapters deal with gravimetric and volumetric estimations of inorganic materials, including such methods as are specially applicable to certain minerals, ores, and metals, and there is a final chapter on gas analysis.

It should be added that the book is one for reference and is not a graduated course of instruction for students. It is, in fact, an abbreviated Fresenius without the undesirable quality of superficial comprehensiveness which characterises that exasperating classic.

J. B. C.

Arnold's Home and Abroad Readers. Book i. Glimpses of the Homeland. Pp. 135. Book ii. Glimpses of the Globe. Pp. 152. Book iii. England and Wales. Pp. 200. Book iv. The British Dominions. Pp. 232. Book v. The World's Great Powers—Present and Past. Pp. 228. Book vi. The World's Trade and Traders. Pp. 228. (London: Edward Arnold, n.d.) Prices from 10*d.* to 1*s.* 6*d.*

THE aim of the anonymous author of these volumes appears to have been first of all to secure the interested attention of his young readers, and then incidentally to teach them a great deal about the physical features of the countries of the world and of the manners and customs of the peoples of the globe. The readers are skilfully graded, well illustrated with maps and pictures, and excellently printed. The books are likely to be popular in elementary schools.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE *No notice is taken of anonymous communications.*]

Chemical Action Produced by Radium.

VARIOUS chemical investigations relating to the chemical action of radium bromide have been in progress in this laboratory during the past session, an account of which will shortly be published.

But one of these investigations has yielded results so extraordinary that we think it well to direct attention to the results. On the Rutherford-Soddy hypothesis of the disintegration of the radium atom, an enormous amount of energy is evolved, and at least one simpler product is formed, namely, helium, which is slowly produced during the disintegration of the emanation, which Mr. Soddy and one of the authors have shown to be a gas, following Boyle's law; and with Dr. Collie the spectrum has been investigated.

It has, of course, often suggested itself that such a change should be reversible; that is, that by imparting a sufficient charge of energy to any atom, it should be transformed into different matter, probably by the building up of a more complex structure. Now the only known source of energy in such a concentrated form is that which is given off by radium and its products during their disintegration. The facts which we have to chronicle appear to point towards such a synthesis.

During experiments on the emanation, about 105 milligrams of radium bromide, dissolved in water, were kept in small glass bulbs, connected to a pump. To protect the bulbs against accident, each was surrounded with a small beaker, one of potash-glass and two of soda-glass. The former was coloured brown in the course of some six months, the latter violet. On altering the apparatus these beakers were discarded.

They were all found to be radio-active on both surfaces,

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